# 8 Implementation Strategy, Cost Opinions, and Planning and Environmental Linkages

At the beginning of the Spine study in 2014, $1.47 billion was specified in the RTP for improving both the I-10 and I-17 corridors. Throughout 2016 and into 2017, the RTP has undergone a rebalancing effort because more revenue is available. MAG, in consultation with ADOT and FHWA, has identified several elements of the Spine study recommendation that have been prioritized as the early projects to be funded. Because the Spine study recommendation total cost is approximately $2.8 billion, nearly half of the recommendation will soon be programmed and under construction. The other half of the recommended improvements are not currently funded, but are expected to be funded when future funding becomes available.

Section 8.1 summarizes the projects that have been funded during the RTP rebalancing effort, their approximate costs and approximate project schedules. Section 8.2 summarizes one possible list of projects that can be implemented when funding becomes available, their approximate cost and justification for the projects' limits and definitions. Section 8.3 summarizes all the projects and their respective detailed cost opinions. Finally, Section 8.4 describes the PEL Questionnaire and Checklist that has been completed in conjunction with the Spine study and how this documentation should be used to inform the NEPA process for all of the projects described in Tables 8-1 and 8-2.

## 8.1 Implementation Strategy – Funded Projects

Table 8-1 lists projects in the Spine study recommendation that are programmed and funded in the RTP, sorted by construction start dates, as of June 28, 2017—when the MAG Regional Council took action (agenda item 5F) to approve these projects. Note that programmed costs do not necessarily match the projects costs defined in Table 8-3. This occurred because the costs used for programming were the best available information when the programming effort occurred in early 2017—prior to the finalization of this document.

**Table 8-1**. Funded and Programmed RTP Projects from the Spine Study Recommendation

| RTP Map ID[a] | Project | Lead Agency | Supporting Agencies | Figures 1-3 and 1-4 Key Map ID Elements[b] | Programmed Cost | Construction Start Date |
|---|---|---|---|---|---|---|
| 15 | I-17: ACDC to Greenway drainage improvements | ADOT | — | Drainage portions of 12, 13, 14, 15 | $30,000,000 | January 2019 |
| 9 | I-17/Central Avenue bridge replacement | ADOT | Valley Metro | 21 | $23,500,000 | May 2019 |
| 11 | I-17/Indian School Road traffic interchange | ADOT | City of Phoenix | 8 | $59,450,000 | January 2020 |
| 4, 5, 6 | I-10: Split to SR-202L (includes all of the I-10 Spine recommendation *except* for those noted in Table 8-2)[c] | ADOT | Cities of Phoenix and Tempe | A, B, 2, 3, 32, 33, 34, 35, 48, 49 | $525,500,000 | May 2021 |
| 12 | I-17/Camelback Road traffic interchange | ADOT | City of Phoenix, Valley Metro | 9, 24 | $68,600,000 | July 2021 |
| 14 | I-17/Northern Avenue traffic interchange | ADOT | City of Phoenix | 10 | $66,850,000 | January 2024 |
| 10 | I-17: Split to 19th Avenue[c] | ADOT | — | 4, 5, and portions of C | $217,350,000 | January 2024 |
| 13 | I-17/Glendale Avenue traffic interchange | ADOT | City of Phoenix | 18 | $75,000,000 | January 2025 |
| 16 | I-17/Thunderbird Road traffic interchange | ADOT | City of Phoenix | Interchange portion of 14, 43 | $113,650,000 | July 2026 |
| 17 | I-17/Bell Road traffic interchange | ADOT | City of Phoenix, Valley Metro | 16, 26, 46 | $96,350,000 | July 2026 |
| | | | | **Total** | **$1,276,250,000** | |

[a] "RTP Map ID" refers to this funded project's identifier in the MAG RFHP.

[b] If only a portion of the Spine key map project ID is part of the project list, it is noted as a "portion of" the project.

[c] Indicates those projects that construct major portions or key elements of the expanded managed lane infrastructure.

## 8.2 Implementation Strategy – Unfunded Projects

Table 8-2 lists those projects in the Spine study recommendation that are unfunded in the current RTP RFHP, but are expected to be funded when future funding becomes available. These project descriptions and limits are subject to change to match funding constraints, timing priorities or alternative delivery packaging. For programming, project schedule dependencies are noted in the last column.

**Table 8-2**. Unfunded Projects from the Spine Study Recommendation

| Project | Lead Agency | Supporting Agencies | Figures 1-3 and 1-4 Key Map ID Elements[a] | Project Cost Opinion | Schedule Dependencies |
|---|---|---|---|---|---|
| I-10/Chandler Boulevard traffic interchange bicycle and pedestrian upgrades | ADOT | Cities of Phoenix and Chandler | 30 | $6,091,000 | None |
| I-10: Galveston Road DHOV traffic interchange | ADOT | Cities of Phoenix and Chandler | 65 | $46,539,000 | None, except may not want to construct until local park-and-rides are open. |
| I-10: Knox Road bicycle and pedestrian bridge | ADOT | Cities of Phoenix and Tempe | 50 | $7,219,000 | None |
| I-10/Warner Road traffic interchange | ADOT | Cities of Phoenix and Tempe | 31 | $11,536,000 | None |
| I-10: Baseline to Elliot C-D roads | ADOT | — | 70 | $98,989,000 | None |
| I-10/Baseline Road traffic interchange | ADOT | City of Tempe | 1 | $25,940,000 | Ideally, traffic interchange would be done after the I-10: Baseline to Elliot C-D roads are open. |
| Split traffic interchange DHOV connector[b] | ADOT | City of Phoenix | 60 | $102,159,000 | Project should be completed just before or along with the I-17 inner loop HOV lanes opening. |
| I-17: 19th Avenue to Indian School Road (includes I-17/7th Street east side DHOV ramps)[b] | ADOT | City of Phoenix, Valley Metro | Portions of C and D, 6, 7, 17, 22, 23, 36, 61 | $376,338,000 | None – project connects to the existing HOV lanes on I-17. Ideally, it would be completed prior to the FCDMC project to address floodplain issue in the area. |
| I-17: Indian School Road to Dunlap Road traffic interchange (includes the I-17/Grand Avenue DHOV connector)[b] | ADOT | City of Phoenix | Portion of D, 11, 38, 39, 41, 62 | $421,132,000 | None |
| I-17: Dunlap Road traffic interchange to SR-101L traffic interchange (excluding the I-17/ SR-101L DHOV connector)[b] | ADOT | City of Phoenix, Valley Metro | E and portions of D; interchange portions of 12, 13; and 15, 25, 40, 42, 44, 45, 47 | $310,234,000 | Completed during or after the completion of the I-17: Stack to Dunlap Road traffic interchange segment. |
| I-17/SR-101L traffic interchange North Stack DHOV connector[b] | ADOT | City of Phoenix | 63 | $139,187,000 | Completed during or after the completion of the I-17: Dunlap Road traffic interchange to SR-101L traffic interchange segment. |
| | | | **Total** | **$1,545,364,000** | |

[a] If only a portion of the Spine key map project ID is part of the project list, it is noted as a "portion of" the project.

[b] Indicates those projects that construct major portions or key elements of the expanded managed lane infrastructure.

## 8.3 Project Cost Opinions

A detailed summary of the cost opinions for these projects is included in Table 8-3. Note that some differences exist between the detailed cost opinions for the funded projects and the programmed costs shown in Table 8-1. This occurred because the costs used for programming were the best available information when the programming effort occurred in early 2017—prior to the finalization of this document.

**Table 8-3**. Detailed Cost Opinions for the Spine Study Recommendation Projects

| Project | Removals and Earthwork | Pavement and Surfacing | Drainage | Bridges | Traffic | Landscaping and Utilities | Roadway and Walls | Mob., CE, Contingency, Environmental Mitigation, Design, ROW, ICAP | Project Total |
|---|---|---|---|---|---|---|---|---|---|
| I-17: ACDC to Greenway drainage improvements | $2,067,000 | $1,932,000 | $12,480,000 | $0 | $1,508,000 | $1,050,000 | $600,000 | $9,796,000 | **$29,433,000** |
| I-17/Central Avenue bridge replacement | $1,601,000 | $1,845,000 | $1,170,000 | $7,636,000 | $2,990,000 | $1,750,000 | $3,380,000 | $13,290,000 | **$33,662,000** |
| I-17/Indian School traffic interchange | $1,717,000 | $1,689,000 | $520,000 | $5,520,000 | $4,355,000 | $3,500,000 | $4,440,000 | $13,789,000 | **$35,530,000** |
| I-10: Split to SR-202L | $43,611,000 | $34,362,000 | $17,940,000 | $45,950,000 | $109,902,000 | $15,050,000 | $47,375,000 | $172,914,000 | **$487,104,000** |
| I-17/Camelback Road traffic interchange | $1,490,000 | $1,958,000 | $520,000 | $9,298,000 | $4,355,000 | $3,500,000 | $4,533,000 | $21,303,000 | **$46,957,000** |
| I-17/Northern Avenue traffic interchange | $1,713,000 | $1,702,000 | $520,000 | $5,548,000 | $4,355,000 | $3,500,000 | $4,827,000 | $15,647,000 | **$37,812,000** |
| I-17: Split to 19th Avenue | $27,103,000 | $20,230,000 | $13,325,000 | $24,739,000 | $68,770,000 | $7,350,000 | $49,119,000 | $123,484,000 | **$334,120,000** |
| I-17/Glendale Avenue traffic interchange | $1,444,000 | $1,517,000 | $520,000 | $5,935,000 | $4,355,000 | $3,500,000 | $5,115,000 | $15,754,000 | **$38,140,000** |
| I-17/Thunderbird Road traffic interchange | $5,074,000 | $5,601,000 | $2,470,000 | $8,880,000 | $17,420,000 | $4,200,000 | $9,601,000 | $29,393,000 | **$82,639,000** |
| I-17/Bell Road traffic interchange | $5,420,000 | $7,143,000 | $2,470,000 | $9,667,000 | $17,420,000 | $12,200,000 | $9,840,000 | $35,675,000 | **$99,835,000** |
| **Funded Total** | **$91,240,000** | **$77,979,000** | **$51,935,000** | **$123,173,000** | **$235,430,000** | **$55,600,000** | **$138,830,000** | **$451,045,000** | **$1,225,232,000** |
| I-10/Chandler Boulevard traffic interchange bicycle and pedestrian upgrades | $0 | $0 | $0 | $0 | $553,000 | $0 | $3,549,000 | $1,989,000 | **$6,091,000** |
| I-10: Galveston Road DHOV traffic interchange | $2,480,000 | $5,566,000 | $3,250,000 | $3,461,000 | $4,680,000 | $2,100,000 | $4,948,000 | $20,054,000 | **$46,539,000** |
| I-10: Knox Road bicycle and pedestrian bridge | $0 | $0 | $0 | $0 | $553,000 | $0 | $3,752,000 | $2,914,000 | **$7,219,000** |
| I-10/Warner Road traffic interchange | $98,000 | $1,495,000 | $260,000 | $930,000 | $1,365,000 | $1,050,000 | $1,830,000 | $4,508,000 | **$11,536,000** |
| I-10: Baseline to Elliot C-D roads | $8,190,000 | $3,542,000 | $27,040,000 | $490,000 | $5,980,000 | $4,200,000 | $16,485,000 | $33,062,000 | **$98,989,000** |
| I-10/Baseline Road traffic interchange | $1,181,000 | $2,376,000 | $520,000 | $490,000 | $2,730,000 | $2,100,000 | $2,992,000 | $13,551,000 | **$25,940,000** |
| I-10/I-17 Split traffic interchange DHOV connector | $3,840,000 | $1,739,000 | $2,600,000 | $36,940,000 | $6,695,000 | $2,100,000 | $11,366,000 | $36,879,000 | **$102,159,000** |
| I-17: 19th Avenue to Indian School Road | $28,243,000 | $29,309,000 | $13,000,000 | $35,692,000 | $64,025,000 | $8,400,000 | $54,690,000 | $142,979,000 | **$376,338,000** |

**Table 8-3**. Detailed Cost Opinions for the Spine Study Recommendation Projects

| Project | Removals and Earthwork | Pavement and Surfacing | Drainage | Bridges | Traffic | Landscaping and Utilities | Roadway and Walls | Mob., CE, Contingency, Environmental Mitigation, Design, ROW, ICAP | Project Total |
|---|---|---|---|---|---|---|---|---|---|
| I-17: Indian School to Dunlap Road traffic interchange (includes the I-17/Grand Avenue DHOV connector) | $18,256,000 | $32,473,000 | $12,350,000 | $13, 218,000 | $97,500,000 | $10,500,000 | $54,121,000 | $182,714,000 | **$421,132,000** |
| I-17: Dunlap Road traffic interchange to SR-101L traffic interchange (excluding the I-17/SR-101L DHOV connector) | $16,711,000 | $27,281,000 | $6,370,000 | $24,066,000 | $56,810,000 | $12,600,000 | $44,740,000 | $121,656,000 | **$310,234,000** |
| I-17/SR-101L traffic interchange North Stack DHOV connector | $10,920,000 | $4,700,000 | $4,225,000 | $44,945,000 | $11,830,000 | $2,100,000 | $14,280,000 | $46,187,000 | **$139,187,000** |
| **Unfunded Total** | **$89,919,000** | **$108,481,000** | **$69,615,000** | **$160,232,000** | **$252,721,000** | **$45,150,000** | **$212,753,000** | **$606,493,000** | **$1,545,364,000** |

## 8.4 Planning and Environmental Linkages Questionnaire and Checklist

The Spine study team has completed a PEL Questionnaire and Checklist using the ADOT-defined template. The PEL process was created in response to the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, which sought to develop corridor studies that could be used more directly to inform the NEPA process on projects identified by the corridor study. Effective, conceptual-level transportation planning studies, such as the Spine study, that follow the PEL process provide opportunities to identify important issues of concern early and to achieve agency, stakeholder and public awareness so that these issues can be successfully addressed. This early planning is not driven solely by regulatory requirements or the quest for more efficient and effective processes, although those are desirable results; transportation and environmental professionals—as well as those in metropolitan planning organizations, state and federal resources agencies, and nongovernmental organizations—are finding that early collaboration helps achieve broader transportation and environmental stewardship goals through better decisions regarding programs, planning and projects.

The ADOT PEL Questionnaire and Checklist were developed to provide guidance, particularly for transportation and environmental planners, regarding how to most effectively link the transportation planning and NEPA processes. By considering the questions and issues raised in the questionnaire, transportation planners are more aware of the potential gaps in their corridor studies, better understand the needs of future users of the study and are reminded of the benefits of wider and/or deeper collaboration with agencies, the public and other stakeholders. Environmental planners who fill out the checklist assume a new role in the transportation planning process by becoming an advocate for early awareness of environmental issues before the NEPA process begins.

The PEL Questionnaire and Checklist was used to effectively influence the scope, content and process employed during the Spine study. Completion of this questionnaire and checklist supported the PEL process and served dual objectives:

- Provided guidance to the Spine study Management Partners regarding the level of detail needed to ensure that information collected and decisions made during the Spine study could be used during the subsequent NEPA processes for the proposed projects described in this chapter.
- Provides the future NEPA study team(s) with documentation regarding the outcomes of the transportation planning process, including the history of decisions made and the level of detailed analyses undertaken.

When conducting a transportation planning study that links to the future NEPA process, major issues include:

- Identifying the appropriate level of environmental analysis for the study.
- Identifying the appropriate level of agency, stakeholder and public involvement.
- Defining unique study concurrence points for seeking agreement from relevant resource agencies, stakeholders and members of the public.
- Developing a process to ensure that the study will be recognized as valid in the NEPA process.
- Identifying when to involve resource agencies in the study, and to what extent they influence decision making.
- Identifying how to persuade U.S. Department of Transportation reviewers to accept the use of these studies in the NEPA process.

These issues were considered extensively throughout the Spine study process as documented in both the Spine NAR and this *Alternatives Screening Technical Report*. The Spine study team members reviewed the ADOT PEL Questionnaire and Checklist at the beginning of the study to familiarize themselves with relevant local and general issues. The questionnaire and checklist was completed in three parts:

- **Questionnaire for Transportation Planners – Part 1**: This was completed by the Spine study team at the beginning of the study and is included in the Spine study NAR in Appendix D.
- **Questionnaire for Transportation Planners – Part 2**: This was completed at the conclusion of the Spine study.
- **Checklist for Environmental Planners – Part 3**: This was updated throughout the Spine study by the environmental planners and was completed at the conclusion of the Spine study.

### 8.4.1 Application of Planning and Environmental Linkages to the Future Spine Recommended Projects

The approved and signed PEL Questionnaire and Checklist for the Spine study will be included as an appendix to the Spine study Corridor Master Plan document, scheduled for completion by the end of 2017. The signed PEL Questionnaire and Checklist will document how the study met the requirements of 23 Code of Federal Regulations § 450.318 (Subpart C: Metropolitan Transportation Planning and Programming). The PEL will provide the basis and justification for the alternatives evaluation phase of the future NEPA documents associated with the Spine study recommended alternative projects, regardless of which agency undertakes the NEPA documentation. Ultimately, this will simplify and accelerate all NEPA documents for every Spine study recommended project.

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